ENGINE PARTS GET BETTER COATINGS

Can You Imagine . . .

. . . a chemical vapor deposition process that coats objects, such as engine parts, that are generally difficult to place inside a traditional coating chamber.

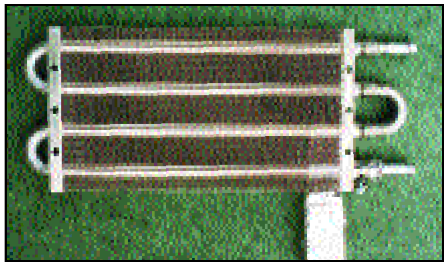
Manufacturers seek quick and affordable methods to apply thin-film coatings on large or irregular surfaces. Typical coating methods, such as physical vapor deposition and thermal spray, deposit films unevenly on assembled parts because of the difficulty placing the parts inside a traditional coating chamber. In addition, thin films are costly for large surface areas in large-scale industrial settings. These barriers have been especially noticed in the high-volume U.S. automotive industry, which sold roughly 15 million motor vehicles in 1994 alone.[1]

Researchers at MicroCoating Technologies (Atlanta, GA) reduced the cost and increased the rate of thin-film deposition through a chamberless process called combustion chemical vapor deposition, or CCVD℠. Using this process, the researchers have been working with engine manufacturers to develop coatings for parts requiring catalytic surfaces as well as protection from heat, corrosion, and oxidation. They expect these efforts to improve engine performance and increase the lifetime and efficiency of automobiles.

SOME OF MICROCOATING TECHNOLOGIES' CUSTOMERS INCLUDE GENERAL MOTORS/DELPHI AUTOMOTIVE SYSTEMS, CATERPILLAR, AND ALLIEDSIGNAL.

CCVD is a flame-assisted process that deposits a wide spectrum of thin-film coatings in open atmosphere conditions. Unlike other low-cost deposition technologies, which produce low-quality coatings, this process can produce the same high-quality coatings as more expensive chemical and physical vapor deposition technologies. It also can coat objects that have large or irregular surfaces, such as engine parts, that are difficult to place inside a traditional coating chamber.

For example, CCVD deposits platinum, an excellent catalytic and corrosion-resistant element, evenly on the entire honeycomb structure of catalytic converters. Unlike other platinum-deposition methods, which may provide only partial coatings and require costly recoatings, CCVD would be a much more efficient alternative, saving car makers both time and money. The process can also deposit corrosion-resistant coatings onto many engine parts, including those used in automotive heating and cooling systems. Customers for these applications include General Motors/Delphi Automotive Systems, Caterpillar, and AlliedSignal.



■ Pictured above is an aluminum radiator coated with platinum using MicroCoating Technologies' CCVD℠ process.

Platinum CCVD coatings will soon be used for fiber-optic applications and are being considered for prototype fuel cell components. Funding from BMDO's SBIR program provided much of MicroCoating Technologies' startup capital and allowed the refinement of the CCVD process.

ABOUT THE TECHNOLOGY

In CCVD, a combustible liquid dissolves the chemical precursor. Then, combustion of the liquid atomizes the solution, forcing the reaction that results in deposition of the material on the substrate. Because the process is simple, deposition of multiple materials and complex compounds proceeds with few complications. CCVD also allows greater control of the physical structure of the coating.

Because the CCVD process takes place at ambient temperatures, without a costly reaction furnace or vacuum chamber, technicians can continuously feed materials into the deposition zone, providing significant cost advantages over traditional thin-film processes. CCVD also uses inexpensive chemical solutions, or precursors, costing up to 100 times less than the high-purity, high-vapor-pressure solutions used in conventional chemical vapor deposition chambers.

[1]Standard and Poor's. 1995. *Industry Surveys*. 27 April, A-82.